TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, April 3, 1905.

The President, HENRY R. WHARTON, M.D., in the Chair.

SCREW FIXATION IN CASES OF INTRACAPSULAR FRACTURE OF FEMUR.

DR. GWILYM G. DAVIS presented a man, forty-seven years of age, who, one year before, had fallen a distance of eight feet, striking on his right hip. The femur on the injured side had been fractured once before, when he was fourteen years old.

On examination, the right lower extremity was found to be shortened about 2.5 centimetres (1 inch). Pain on movement of the hip was very severe. The foot was everted, the fascia lata lax, and the greater trochanter moved with rotation of the leg. It was found to lie above Nélaton's line, and the base of Bryant's triangle on the injured side was shorter than that of the sound side. In short, there were present all the classical signs of a fracture of the neck of the femur. A skiagraph showed a line of fracture beginning above high up on the neck near the articular cartilage and running down almost vertically. The outer fragment was pushed up and was above the inner fragment.

On the sixth day after the injury an incision about 7.5 centimetres (3 inches) long was made over the greater trochanter, and an ordinary steel wood screw 7.5 centimetres (3 inches) long inserted up through the trochanter and neck into the detached head, traction in the meantime being made by an assistant. A plaster-of-Paris dressing was then applied, embracing the pelvis and down to the knee, and later the leg was placed on a sliding foot-piece to keep the foot from everting. The wound healed without trouble, but a sinus formed later at the site of the screw, and it was removed after having been in eight weeks. Two or three weeks later the patient was discharged, and now, a year after, he has apparently bony, or at least firm, union, very little shortening, almost normal movements, a slight loss of abduction, and walks comfortably without any support, and only a slight limp due to the uncorrected small amount of shortening.

Dr. Davis further remarked that the results obtained by the various methods of treatment of fractures of the neck of the femur in those other than children and the aged are as yet so unknown that it is impossible to say which is best. That the methods usually pursued and the results obtained by the mass of the profession are unsatisfactory is evident from the frequency with which ununited fractures of this part are seen. In children, conservative treatment by splints and apparatus has been demonstrated to be efficient. In the aged, say, those over sixty years, bad results are accepted with a certain amount of resignation; but when an otherwise healthy man, from twenty to fifty odd years of age, is left with an ununited fracture of the neck of the femur, the distress and disability are so marked as to justify radical measures in order to avoid it. Many of these patients have more or less pain, a marked hobbling gait, and are often compelled to use a support, such as a cane or crutch. They are debarred from all active occupations, and perhaps relegated to the ranks of useless cripples., The most usual way of treating the injury is probably by weight extension, the same as if the fracture was lower down. The uselessness of this method is seen from the resulting ununited fractures. Of the value of other methods we have as yet too little data to judge. The treatment of this fracture in the aged by the method of combined weight extension and lateral traction has in his hands been far more satisfactory than by weight extension alone. The method of placing the limb in an abducted position in plaster-of-Paris is likewise better than using weight extension alone. He had recently had one good result from this method, but, to offset this, he recently saw a case in which the method had been equally faithfully applied without union occurring.

Having previously operated on several cases of ununited fracture, he decided to apply a modified form of the same method to recent fractures of the neck of the femur, and the good result obtained in the case shown had encouraged him to resort to the same plan in future cases.

Dr. W. W. Keen briefly detailed a case in which he had employed a device similar to that of Dr. Davis. The lesion differed, however, in being an old, ununited fracture which required an anterior incision to freshen the bone in addition to the lateral one for inserting the screw. The patient can now walk without the aid of crutches or a cane. Two screws were employed to unite the fragments in this instance, and they are still *in situ* after more than a year. The case will be reported in full later.

Dr. Robert G. Le Conte said that the proposition advanced by Dr. Davis, of immediate operation in intercapsular fracture of the thigh, was a very broad one. In these days of modern asepsis the ideal treatment of fracture of the femur is perhaps the open method, whether the break is intercapsular or of the upper portion of the shaft; and yet no one is quite bold enough to carry out this method in every case. In Dr. Le Conte's experience in patients whose ages range from forty years to extreme old age, the non-operative methods of treatment in intracapsular fractures result in giving useful and valuable legs in perhaps 80 per cent. of the cases; in about 20 per cent. this favorable result is not obtained. These statistics are not exact and are given from memory only. Granting that good results are obtained without operation in four out of five cases, why should we not continue the expectant method of treatment as opposed to the operative. If union fails to occur, operation can be later performed with little, if any, radical risk. It should be remembered that some of the cases of useless limbs following the expectant or non-operative treatment are due to osteophytes forming about the seat of the fracture and mechanically interfering with the motion of the joint, and not to ununited fractures. Dr. Le Conte would be very loath to indorse the statement of Dr. Davis that the majority of recent intercapsular fractures of the femur should be treated by the open method.

Dr. John B. Roberts did not believe the ideal method of treating fractures of the femur is by incision; in certain cases only is it advisable. In fact, the ideal method is treatment without incision, especially in fractures of the shaft. Unless the break is in the upper third, we expect good results from treatment by traction, elevation of the bed to secure counter-traction, and lateral support. He approaches such cases with utmost confidence that good results will follow this treatment, and in but few cases is there disappointment. Contrary to Dr. Le Conte, he would not call this expectant treatment. In the case of fracture of the neck of the femur we are not always sure that it is intracapsular; in the case exhibited, the skiagraph seems to indicate that it is partly outside the capsule, which is often the true condition present. In Dr. Roberts's experience, in a man of the age of Dr. Davis's patient with a fracture not entirely intracapsular, good results may be expected from treatment by weights, countertraction, and lateral support. This he would not call the expectant, but the non-operative method of treatment. It is interesting to hear Dr. Davis speak of the sinus following the use of the screw, as that has been Dr. Roberts's experience with the use of nails. Suppuration nearly always occurs, and there is delay in closure of the sinus after the nail is withdrawn. Dr. Roberts has been surprised to find good results without operation in a few patients seventy or eighty years of age, with what were at least supposed to be intracapsular fractures. When the fracture lines are apparently through the base of the neck outside of the capsule, a good leg should be expected without operation.

Dr. Davis, in closing, said that an interesting point in these cases is the correctness of the diagnosis; it is often difficult to demonstrate whether the break is intra- or extracapsular. Anteriorly, the capsule extends downward to the anterior intertrochanteric line, and nearly every fracture is bound to be intracapsular at this point. Posteriorly, the capsule extends half-way to the intertrochanteric line, and in some instances even more. Hence many fractures are partly intra- and partly extracapsular. It is not possible to make a differential diagnosis with any degree of certainty. He supposes that Dr. Le Conte's statements refer to fractures of the neck alone, as it is well known that extracapsular fractures involving the trochanters unite readily and with an abundance of callus. As to fractures of the neck they are not so satisfactory. If Dr. Le Conte's figures embrace all the fractures of the aged, 80 per cent. of good results is a trifle high; he is not willing to admit this. Dr. Roberts' statements regarding the good results in fractures partly intra- and partly extracapsular are not capable of verification; as such diagnosis cannot be made, the absolute condition is unknown. As to the results of intracapsular fractures, it was held years ago that they almost never unite by bony union. When they are partly intracapsular and partly extracapsular, good results might be expected in young adults. Notwithstanding this, the experience of Dr. Davis is that results in general are bad in fractures of the neck of the femur in young and middle-aged adults; this opinion is based on eight or ten cases seen during the past four years, all in individuals between twenty-five and fifty years of age. Ununited fractures during this period are not uncommon. Dr. Davis does not advise operative treatment in children nor in the aged. In the latter class, reparative efforts are slight; in children, conservative methods give good results. In certain other cases, as in the patient exhibited, disability from failure of conservative treatment is so great, and the occurrence of this result so frequent, that a more positive method of treatment is desirable. Dr. Davis does not, however, positively advise open operation in all cases, but would not hesitate to employ it in comparatively young adults, under sixty, otherwise healthy, who have intracapsular fracture. For treating these fractures there are now recognized two methods that are still largely untried. They are, 1, placing the thigh in abduction, and, 2, applying longitudinal traction and lateral traction combined. The use of these methods has as yet not been so extensively reported as to determine their true value. As a competitor of the two, to be tried out with them, Dr. Davis adds a third, the open incision and insertion of a screw as detailed in the reported case. The operation is simple, being little more than a straight incision with insertion of the screw while extension is made. Healing always readily occurs. When the screw loosens, an inflammatory focus forms beneath the scar and this tissue soon gives way, producing a sinus through which the screw may be removed. Operation does not appreciably add to the danger of the treatment and gives improved results.

ANTHRAX.

DRS. G. J. SCHWARTZ and B. FRANKLIN ROYER presented, jointly, a man, aged twenty-four years; white; single; occupation, farmer, who was admitted to the Jefferson College Hospital, in the service of Dr. W. W. Keen, February 21, 1905, suffering from anthrax, and with the following history:

The farm on which he labored was situated at the head of a small stream, along the borders of which a number of cases of bovine anthrax occurred in 1899. Some of them were in the immediate vicinity of the farm. Since then this meadow land has been "out of the tide," so that it has been impossible to pasture cattle or cut hay. The farm being at the head of this stream has made the meadows drier and admitted of some pasturage, and last season considerable rough hay was cut upon it. Unknown to the health authorities, two apparently healthy mules belonging to the patient's father became suddenly sick, and died within two days of each other. The supposition was then that they were poisoned. Their carcasses were buried in this field. Later in the season, a crop of hay was harvested from the field. This hay comprised a portion of the fodder of the stock farm.

On February 12, 1905, two apparently healthy cows, which had been eating the hay harvested from the above mentioned field, were turned out in the morning and died during the day. The patient skinned the last cow which died and sold the hide to a dealer, who expressed it to this city. The patient noticed while skinning the cow that a bloody serum exuded from several sores on the hind quarters of the cow.

On February 14, 1905, two days later, the patient noticed a small red spot, which resembled a flea-bite, situated about one inch above the left wrist-joint on the posterior external surface on a line passing through the first metacarpal bone. The next day two papules appeared on flexor surface of the same wrist. These papules gradually became larger and were accompanied by slight itching and burning. During the next day a small blister containing a yellow serum streaked with blood and surrounded by an inflammatory band, œdematous, with overlying skin of livid hue, appeared.

On February 18, six days after skinning the cow and four days after the lesion appeared, the patient complained of slight headache and cough; by this time œdema had involved the hand, wrist, and was rapidly extending up the forearm; blisters had become blebs, were tense, and contained a distinctly blood-tinged, yellowish serum.

The following day, February 19, he became alarmed about his condition and went to bed. The headache became very severe. Cough became productive, pain in arm throbbing, swelling extended rapidly to the arm. Now, for the first time, the patient sent for his family physician. Local applications were made. During the night the patient was restless, could not sleep, and felt much weaker.

On February 20, condition was much worse, and his physician decided to send him to the Jefferson Hospital, where he arrived February 21.

His condition on arrival was as follows: Facial expression was that of a person suffering considerable pain and mental anxiety; face was flushed, and there was slight sweating about the forehead; pupils dilated, tongue slightly coated and dry, slight nausea with no vomiting; temperature, 100.4° F.; pulse, 82, soft, compressible; respiration, 24. A brief physical examination of chest showed heart and lungs apparently normal with the exception of a few râles posteriorly on both sides. The left hand, forearm, and arm to within 10 centimetres of the shoulder-joint were immensely swollen. The swelling pitted on pressure, and there was an entire absence of emphysematous crackling. The overlying skin was of a slightly dusky red color, and pressure caused the redness to slowly disappear, but it returned slowly when pressure was removed. The axillary lymph glands were not palpably enlarged, but on palpation the spleen seemed to be enlarged. Situated along the forearm on the flexor surface were several medium-sized blisters containing a cloudy, yellowish serum, and just above the wrist-joint over the line of the artery was a large bleb the size of a half-dollar, filled with blood-stained serum.

Smear preparations, cultures, and a blood examination for the anthrax bacillus made, and within one hour's time a verbal bacteriological report confirmed the clinical diagnosis.

The report, from a later more exhaustive examination, was that the bacilli obtained in spreads from the blebs of the left forearm possessed the morphological and tinctorial characters of the Bacillus anthracis. In cultures, a bacillus, possessing the morphology, tinctorial, and biological characters of the Bacillus anthracis in pure culture. The blood taken from the right arm developed no growth, indicating in all probability that the infection at the time of examination was local in nature.

The following treatment was carried out: The patient was etherized and five drachms of a 3 per cent. solution of carbolic acid was injected into the skin and superficial fascia, so it would completely encircle the arm one and one-half inches above the infiltrated tissues. The bullæ over wrist and back of forearm and a ring of healthy tissue around each of these were excised down to the deep fascia. The infection did not seem to go below the deep fascia except over the radial artery just above the wrist. This suspicious tissue was removed, and in doing so the radial artery was wounded. After tying both ends of the artery, several syringefuls of a 3 per cent. solution of carbolic acid were deeply injected into the tissues around the areas removed. After this was completed, long multiple longitudinal incisions were made into the œdematous tissues, allowing a large quantity of clear yellow serum to exude.

The tissues, on incision, presented a yellowish color, gelatinous and very friable. At no point was any pus found. The limb was then wrapped in hot antiseptic fomentations, placed on a pillow, and surrounded by hot-water bags.

At the end of the operation the patient was severely shocked and intravenous infusion of salt solution was then given by Dr. Anderson.

The patient received free stimulation-strychnia and atropine, and every three hours, while he remained in the hospital, received a hypodermic injection of 30 minims of 3 per cent. carbolic acid.

The patient was transferred to the Municipal Hospital the following morning after the operation. His condition on removal was fair.

On February 23, 1905, was received a report from the State Board of Veterinary Medical Examiners, stating that the body of the cow skinned by the patient showed lesions of anthrax.

Dr. Schwartz said that most authorities advise excision[1] of the malignant pustule and cauterization with pure carbolic acid.[2] Tillmans, of Leipsic, holds that anthrax remains local longer in man than in animals; hence, excision and cauterization should be employed in human anthrax. He excises the area of infection, going well into healthy tissues, and cauterizes it, then injects in and about it a 1 to 1000 solution of bichloride of mercury and a 5 per cent. solution of carbolic acid. By this treatment,[3] Lenoyel and Koranyi lost but thirteen cases out of 142. Müller,[4] in opposition to the above treatment, says that it is impossible to destroy the disease by excision of the seat of inoculation. In guinea-pigs, amputation of a limb performed a few hours after inoculation fails to prevent the disease. His belief is that treatment should aim to make the cells about the inoculated area prevent dissemination of the bacteria and protect the body. The products are injurious, if absorbed, but they also tend to destroy the bacteria, hence excision is harmful.

Müller's treatment is as follows: Immobilize the parts, and elevate, if an extremity, apply mercurial ointment and give alcohol internally in large doses. He describes thirteen cases successfully treated by the above method. Notwithstanding the above, the majority of reports lean towards excision with cauterization of the infected area.

Cauterization with cautery, pure carbolic acid, caustic potash, hydrochloric acid, acid nitrate of mercury, and, in fact, every caustic substance known, has been either tried or suggested.

Medical Treatment.—Muskett[5] notes the treatment of fifty cases by simple applications of ipecac to the area of infection without excision, and without a fatal result in any case.

Laboratory experiments have shown that powdered ipecac will destroy the anthrax bacillus, but has no effect on the spores, and in the body sporulation does not take place.

Injection Method: Scharnowski[6] reports the treatment of fifty cases by carbolic acid injections, with a mortality of 2 per cent.

Graef[7] reports the treatment of 384 cases by cauterization with caustic potash, with a mortality of 5 per cent.

The treatment by caustics is, however, very painful, and, after all, it seems impossible to say which treatment is best for all cases, for each individual case must necessarily be considered as standing absolutely alone.

Dr. B. F. Royer stated that on admission of the man to the Municipal Hospital, smears made from scrapings from the floor of the extirpated areas, and smears of blood made from a finger prick, failed to show anthrax organisms. The blood count at this time showed: Leucocytes, 19,400; erythrocytes, 3,210,000.

Hæmoglobin not estimated.

Differential count (600 cells count); polynuclear leucocytes, 87.68; large lymphocytes, 7.66; small lymphocytes, 2.66; eosinophiles, 2.00.

Urine Analysis.—Chemical Examination. Amber, acid, 10.12, no sugar, albumen.? Microscopic Examination. Leucocytes. Numerous hyaline, epithelial, and granular casts. Urine centrifuged, and the sediment examined for anthrax organisms with negative result.

Smears and cultures made at this time from the nasal secretions from the saliva and from the fæces failed to show anthrax germs.

Second day after admission, tenth day of the disease, physical condition improved; pleuritic pain less marked; pulse of better volume; temperature normal; urine loaded with hyaline and granular casts.

Eleventh day of disease, third after operation, abdominal distress and frequent desire for stool suggests mercurial poisoning. Salt solution substituted for the arm. Blood culture made second day after admission negative.

From this time on nothing of very great interest resulted. Leucocyte count, sixth day after admission, fourteenth day of disease, is 20,400. Erythrocyte count, 3,400,000. Urine still filled with hyaline and epithelial casts. Anæmia probably due to nephritis. For the next few days the kidneys were somewhat erratic, 111 ounces being voided on the seventh day after operation and 128 ounces the ninth day after operation. General condition seems to be good.

Blood culture made nine days ago still showed no growth.

From this time until the forty-fourth day of his disease nothing worthy of special consideration occurred. He was detained at the Municipal Hospital thirty-five days, while the wounds from operation were healing. On being discharged, he returned to Professor Keen's clinic, where he was shown to the students.

Dr. Royer remarked, further, that the most marked advance in the treatment of anthrax has been made in Italy. In America, where the disease but infrequently occurs, we are apt to lose interest in the disease, or we may fail to keep in touch with the most recent advances in its treatment. This disease has long been considered a surgical affection. The day seems to have dawned, however, when a more scientific treatment is available. This newer method of serum treatment was introduced by Professor A. Sclavo, of the University of Siena, in 1897. The underlying principle with this therapy, and in fact with nearly all serum therapy, is to get from a susceptible animal the substance manufactured by that animal in acquiring a tolerance to many times its fatal dose of toxin.

Sclavo's[8] method of producing this serum is based on vaccination and upon immunization by toxin injection. He first vaccinates an ass with an attenuated anthrax culture, and in ten or twelve days with a more virulent culture. So far, then, the process is like vaccination in principle. The object is to protect against a dangerous disease by deliberately inoculating with a harmless disease. This is the method practised by veterinarians in immunizing herds. The next steps are to use virulent cultures of anthrax in increasing quantities until enormous doses can be tolerated. This is comparable to the process in making diphtheria antitoxin, but differs from it as follows: In inoculating horses, to make antidiphtheritic serum the toxin only is used. This germ can readily be separated from its toxin. Not so, however, with anthrax. Here we have an intracellular toxin. (At least it appears to be intracellular in artificial media.) For this reason it is necessary to inject the entire culture. The process and results, however, are very similar to that of making diphtheria antitoxin. After a period of several months of such treatment, the ass is bled, and the serum separated from clot is preserved by adding ether to the extent of 3 per cent. of its bulk. The serum is now tested on rabbits by first inoculating a series for controls and an equal number for treatment with 5 cubic centimetres of a suspension of a culture of anthrax grown on agar for two days. The test rabbits are given at the same time 10 cubic centimetres of the prepared serum, usually by injection in an auricular vein. This testing, you see, is similar to the test for diphtheria antitoxin. If the controls all die and the treated ones are all protected, the serum is regarded as high grade. As yet, Sclavo seems to have no method of standardizing as we have in the production of diphtheria antitoxin.

Sclavo's[8] present contentions are as follows: (1) The serum is innocuous even in large doses; (2) it can be well borne, even when introduced into the veins; (3) no case taken in an early stage and of moderate severity will be fatal if treated with the serum; (4) by its means some cases may be saved when the condition is most critical (he narrates one case in which a woman recovered after bacilli were found both in the blood and urine, and another in which they were present in the urine); (5) when injected into the veins it quickly arrests the extension of the œdematous process, so as to reduce notably the danger of suffocation which is present in many cases when the pustule is situated on the face or neck; (6) if used early enough, it reduces to a minimum destruction of the tissues when the pustule is localized, and thus diminishes risk of deformity; (7) persons attacked appear to become convalescent almost at once. The dose of serum recommended in ordinary cases is 30 to 40 cubic centimetres subdivided into three or four injections, subcutaneously into different parts of the abdomen, and followed in twenty-four hours, if there has been no improvement, by further injection of 20 to 30 cubic centimetres. In very grave cases he recommends intravenous injection, preferably into one of the superficial veins on the back of the hand, of 10 cubic centimetres, followed in an hour or two, where no improvement is shown, by another similar dose.

Bandi[9] reports two cures. In one cauterization had failed. There was œdema of the entire arm, the glands in the axilla were as large as a hen's egg. Fever, 104° F.; pulse rapid and intermittent and patient in coma. Anthrax organisms were found in blebs surrounding the cauterized areas and in the blood by culture. In this case 150 cubic centimetres of a serum, prepared by using a sheep and Sclavo's methods, were given intravenously, and followed later on the same day by 50 cubic centimetres intravenously.

In his second case, with temperature 103° F., rapid, irregular pulse, swelling and œdema of the arm, and with a positive blood culture, cauterization, and 80 cubic centimetres intravenously and later 30 cubic centimetres subcutaneously, promptly cured the patient.

Recently, Lockwood[10] and Andrews treated a case of malignant pustule of the cheek with 40 cubic centimetres. Sclavo's serum injected subcutaneously. No other treatment was given; the œdema increased, the enlarged glands subsided. Recovery most satisfactory.

Bowlby and Andrews[11] report a case of malignant pustule of the forehead treated with Sclavo's serum and recovery. In this case the glands at the angle of the jaw were much swollen. They rapidly subsided. The œdema extended for a time after treatment was begun. Recovery was satisfactory in every particular. No other treatment was given.

Legge[12] has studied a series of cases treated by Sclavo and others in Italy, and those treated in England since July, 1904. His study, reported in his Milroy Lecture, would encourage one to recommend anti-anthrax serum as almost a specific against this dreaded disease if given early. If given late, it may be necessary to practise excision or free drainage in addition to serum therapy.

From the data presented by Legge, Bandi, Soberheim, and Sclavo it would appear that the time had come when we in this country should have a supply of anti-anthrax serum kept by health boards or research laboratories where it might be gotten in a few hours by those called upon to treat anthrax.

When this case was sent to the Municipal Hospital, he communicated with Parke, Davis & Co., H. K. Mulford & Co., the Marine Hospital Laboratory, and through Dr. Cairns, of our health office, with the Bureau of Health of New York, but could find no serum in this country. This patient's treatment consisted of stimulation with whiskey, strychnine, and quinine, carefully looking after the emunctories and diet, and flushing him with large quantities of water. When evidence of mercurialism developed, the bichloride dressing was omitted. Salt solution was used for twenty-four hours, and then potassium permanganate, 1 to 5000, as a wet dressing. Later, a 1 to 8000 bichloride dressing was used until the arm was nearly healed. Where the indurated areas were dissected out, curettement was required, and, later, stimulation with silver nitrate brought granulations to the surface.*

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[10] Lockwood and Andrews. British Medical Journal, January 7, 1905.
[11] Bowlby and Andrews. British Medical Journal, February 11, 1905.
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Dr. W. W. Keen said that when the resident physician notified him by telephone of the patient's admission, he at once suspected some animal disease, as anthrax or actinomycosis, and directed that a bacteriological diagnosis should be made at once. The subsequent history shows that we now possess a thorough means of prompt diagnosis, as within one hour the examination had been made and anthrax bacilli found. Dr. Keen saw the man one and one-half hours after admission. A slight pimple had been present on the wrist, but no pustule. The most conspicuous features were a number of large blebs and an enormous œdema of the arm. At the deltoid insertion the arm was fully one and one-half times as large as immediately above that point. The case then was one of anthrax œdema. The communicability of the disease to others demands attention. This patient was isolated, and the operation performed in the same room rather than in the operating-room. Afterwards the bacilli were repeatedly recovered from the room, five separated disinfections being required to remove them; removal of the floor was at one time seriously contemplated. This shows the great importance of investigating rooms where fluids have fallen during operation, as otherwise subsequent patients might very easily obtain anthrax infection. Dr. Keen has communicated with Dr. Abbott, of the Philadelphia Bureau of Health, who has taken steps to secure from Professor Sclavo, of Italy, some of the serum which has been used with such good results. It is hoped that the serum may be kept on hand to use in future cases.

Dr. De Forest Willard believed that even when serum treatment is employed, the original point of infection in anthrax should be excised in order to get rid of all the infection possible. He detailed a very severe case that occurred in a wool-sorter. There was a pustule with blebs and an ulcer of the cheek; anthrax bacilli were present in great numbers. Immediate diagnosis was followed by immediate removal of the pustule and by cauterization. Though there was great local œdema, speedy amelioration of the local symptoms followed. The patient, however, apparently infected his food, and in two or three days there was enormous distention of the abdomen with tormina and tenesmus, twenty or thirty stools occurring daily. Suppuration followed, and three quarts of pus were removed from the abdomen and several ounces from the scrotum. For weeks the patient was almost at the point of death, but he finally recovered. Antistreptococcic serum was employed during a week or two, but incision appeared to do the most good. The patient was isolated and none of the attendants became infected. The room was thoroughly disinfected, and no other case developed.

Dr. John H. Jopson spoke of the frequency of anthrax in Philadelphia; he regards it as more common than most physicians suppose. He saw and reported a case some years ago from the Episcopal Hospital dispensary, it being the first of a small series of cases occurring among the morocco workers in that neighborhood. Mutchler, Miller, Willard, and Given have also reported cases, at least eight, occurring during the past ten years. Three were treated in their own homes by hypodermic injections of carbolic acid and recovered.

Dr. Royer, in closing, said the precautions taken with the patient at the Municipal Hospital consisted in keeping him in a tent and disinfecting the discharges with 3 per cent. solution of carbolic acid for one-half day. The nasal secretions and sputum were collected on gauze and immediately burned. The linen was soaked one-half day in 3 per cent. carbolic acid, then steam sterilized, boiled, and washed. The question of disinfecting the outfit when the patient left the hospital was solved by placing the tent, bedding, and other contents in the large steam sterilizing apparatus used in disinfecting clothing for the city and subjecting them to live steam, under five pounds pressure, for one hour on each of three days. Three test objects containing anthrax bacilli were also exposed, one being removed at the end of each sterilization; the bacteria were all destroyed. The bedding has since been used with no untoward result.

FILLING DEFECTS IN THE SKULL BY BONE CHIPS FROM THE OUTER TABLE OF THE NEIGHBORING BONE.

Dr. W. W. Keen reported the case of a man, aged twenty-four years, first seen by him September 15, 1903.

Three years previously he had received a violent blow from a golf-stick on the forehead just below the border of the hair and about 1 centimetre to the right of the median line. The golf-stick was broken and a portion of it was left sticking in the wound. He was knocked down by the blow and stunned. With assistance, in a few minutes he got up and walked to the house.

He was never unconscious, was never sick enough to be in bed. A local doctor who was called seized the bit of golf-stick, pulled it out, and sewed up the wound. Healing took place by first intention, and the wound never gave him the slightest trouble in the way of headache, pain, or other disturbance until about a month ago, when a small abscess formed at the site of the accident and discharged a little pus. The day after the accident he went with a party of young people on a "hay ride." Neither he nor his doctor or friends had the least idea that his skull had been fractured.

Examination revealed, just below the border of the hair, a scar about 3 centimetres long and at its middle a sinus, the result of the old abscess. A probe discovered some bare bone.

An incision was made in the line of the old scar, which disclosed an unsuspected triangular bit of wood 1.5 centimetres long, 8 millimetres broad, and 4 millimetres in thickness. As soon as this was removed, it was apparent that it had filled up a depression which was 1 centimetre deep. At the time he received the blow, the skull had been fractured with depression of the fragment, and implantation of two pieces of the golf-stick in the wound. One piece had been removed, and this second piece of wood, together with the tissues about it, filled up the depression, so that no irregularity existed on the surface.

Inasmuch as Dr. Keen had seen two cases of fibroma and sarcoma result from such a depression of the skull, and epilepsy in many other instances, he deemed it essential that the depressed portion of bone should be removed. Accordingly, he carefully chiselled the depressed portion through until he reached the dura, and then by means of the rongeur forceps removed all of the depressed bone. The depressed portion exercised considerable pressure on the dura. In removing it he had to uncover the superior longitudinal sinus. The opening that he made was 3 by 2 centimetres.

The patient made a prompt recovery without any rise of temperature whatever.

A second operation to fill in the aperture in the skull was done February 23, 1904. He first made a flap, including the old scar and the scalp on each side of it, by a semicircular incision with its convexity posterior, the ends of which barely reached the border of the hair; the rest of it being therefore covered by the hair. From this first incision he made a second directly backward. Dissecting these flaps away, he was able finally to lay bare the dura and the healed margins of the opening. By the rongeur forceps he made the margin raw all around the opening. He then chiselled a number of pieces from the outer table of the skull under the flap that he had turned back and filled in the opening in the skull entirely. The flaps were then replaced and sewed together, a small bit of folded rubber dam serving as a drain for twenty-four hours.

The man made a perfectly smooth recovery without any rise of temperature. On the ninth day he went home. The ugly depression on his forehead which had existed prior to this operation had entirely disappeared, and, with the exception of one point where there was a very slight prominence of one of the bone chips, his forehead was entirely normal.

In the autumn of 1904, six or seven months after the last operation, he was seen, and it was found that the inequality in the surface of the skull had entirely disappeared.

Dr. Keen remarked that this case was worth reporting on account of the entirely unsuspected nature of the injury, for no one examining his skull would have supposed that there was a depressed fracture. In addition to this, the mode of filling up the aperture is one which he first proposed probably eight or ten years ago. He had now practised it in fully a score of cases. This is the smallest opening he had filled by these bone chips chiselled from the neighboring outer table. In other cases he had filled in areas 6 to 7 centimetres by 3 to 5 centimetres, in other words, large openings. The skull becomes in time very solid and strong, reproducing practically a normal skull so far as both outline and protection are concerned. The margins of the opening, of course, should always be made raw by the rongeur forceps, and the pieces of bone which fill in the opening should not be too large. He had found the best instruments for procuring them are a gouge and mallet. Never in a single instance had he had any of the pieces of bone undergo necrosis, and so to require removal.

EXCISION OF THE TIBIA.

Dr. Francis T. Stewart said that he was indebted to Dr. Le Conte for the privilege of operating upon and reporting the following case:

The patient is a Polish boy, aged ten years, from whom it was difficult to obtain any definite history. About seven months ago the right knee and leg suddenly swelled and became excessively painful. The patient was confined to bed for several weeks with marked constitutional symptoms, and has not been able to use the leg since. There is no history of injury. At the time of operation, the entire tibia and the lower end of the femur were markedly thickened, and the knee was ankylosed at an angle of about 40 degrees. Along the course of the tibia were numerous sinuses leading down to necrotic bone. Under ether a feeble attempt to straighten the knee resulted in a fracture of the femur just above the condyles, thus allowing the limb to be fully extended. An incision was made down to the tibia from the knee to the ankle and the entire diaphysis excised subperiosteally, leaving the lower epiphysis and a shell of the upper. In curetting the upper epiphysis the instrument at one point entered the knee-joint, which was found to be filled with hard, fibrous tissue. The entire wound was packed with sterile gauze and the limb placed in a fracture-box. Bacteriological examination of the specimen showed the infection to be that of the Staphylococcus pyogenes aureus.

Dr. Stewart said that he had had two other similar cases, one concerning the tibia and the other the fibula. The tibial case was a boy of twelve years who developed an acute osteomyelitis following a trivial injury. The limb was treated for four weeks with poultices, at the end of which time he saw him and excised the bone subperiosteally, saving the upper and lower epiphyses. At the end of six months the tibia had regenerated and was much thicker than normal. There was a little flexion of the knee and a slight varus of the leg, but withal a useful limb. In the fibular case, a boy of nineteen years, a contusion of the outer side of the leg was followed within a few days by marked constitutional disturbance, which was diagnosticated typhoid fever. Four months later he saw the patient, and removed the bone subperiosteally, excepting a small portion of the upper and lower ends. The infection in this case proved to be the Staphylococcus pyogenes aureus. The bone regenerated promptly, and the patient returned to his work as a laborer at the end of six months.

At the 1904 meeting of the American Surgical Association, Dr. Johnson read a paper on this subject, and among other points emphasized the following: Regeneration in all his cases, six in number, was rapid and complete. Deformity never results where a disc of bone is left between the shaft and the epiphysis. The companion bone invariably takes on compensatory hypertrophy. During the operation the periosteum should be spared as much as possible, and the curette should be used very cautiously. The leg should be immobilized in a fracture-box and frequent and rough dressings avoided. The part should be moulded with bandages or adhesive strips as bone tissue develops, and the young bone should be protected by means of plaster of Paris.

Nichols (*Journal of American Medical Association*, February 13, 1904) states that the reason the regenerated bone is at first much larger than the original shaft is that the bone is not completely ossified. In time the size decreases almost to normal, and, judging from skiagrams, a new medullary canal develops. He thinks the best time for operation is about two months after complete drainage of the acute infection.

In regions, such as the thigh or the arm, where there is no companion bone to act as a splint and maintain the length of the part, one should wait until the periosteal shell of regenerating bone is sufficiently advanced to preserve the contour and bear the weight of the limb. Roughly, this stage is reached when the periosteal shell, as determined by the X-ray, is equal to one-fourth of the diameter of the original shaft.

DR. ROBERT G. LE CONTE said that he had operated upon six cases of osteomyelitis where the whole shaft of the tibia was involved in the disease. These cases varied from the very acute to the very chronic stages of necrosis, the duration of the disease being from five days to seven or eight months. He believes that the deposition of bone from the unremoved periosteum depends upon the length of time the disease has lasted. In the chronic cases, months after the onset of the acute symptoms, the regeneration of bone is reduced to a minimum, while in the acute stages, say two or three weeks after the onset of the disease, the periosteum is in an active state for bone regeneration. In the personal cases mentioned, more or less good bone was formed in four of the patients with useful limbs; partial deposit occurred in one, and in the other no bone whatever was formed.

DR. DE FOREST WILLARD said his experience had not been so favorable, since regeneration of bone is slow and imperfect in old cases. Osteomyelitis should be treated as is appendicitis, by early diagnosis and early operation within forty-eight hours if possible, not waiting until the case has been treated for months for other diseases, as rheumatism, typhoid fever, etc.

DR. JOHN H. GIBBON referred to the report of a case by Dr. Huntington, of San Francisco (ANNALS OF SURGERY, February, 1905), in which the entire shaft of the tibia had been removed and the shaft of the fibula substituted. After the removal of the tibia the result was not completely satisfactory, and the author divided the fibula near one of its extremities and attached it to the corresponding epiphysis of the tibia. A few months later the other end of the fibula was also divided and attached to the other epiphysis of the tibia. The result of this transference was most satisfactory.

DR. STEWART, in closing, said that several cases of bone grafting had been reported. The bone is obtained from the same individual or from animals. Morton used in one case bone from a dog, and Senn has employed a similar expedient, using bone from the same individual.